the headwaters of the Narbadá, the Tapti, the Sône, and affluents of the Màhànadi.

The author, who, in the course of his professional duties, acquired a close and intimate acquaintance with the country and its inhabitants, commences by giving a sketch of the probable history of the various races found in this wild and, until lately, almost unexplored country—races whose ethnological and religious history possess peculiar interest; because here the Aboriginal tribes, the races of mixed Aryan and Aboriginal blood, and the Hindoos proper, can be found living side by side; and the effects of the colonisation of the district by the Aryans of Hindustan can be traced out with some degree of clearness.

A considerable portion of the book is devoted to the author's sporting experiences. These he relates in a lively and spirited style; but as the reminiscences of Indian sportsmen have a strong family likeness, this part of the book does not call for much notice, except that the author appears to make rather too light of the danger of bison-shooting, and makes some statements concerning this game which are scarcely correct, one of these statements being that the animal is always known under the name of *bhìnsa*, or more correctly *bhainsa* (a word resembling in sound the English word bison), and never as *gaur*. Now in the very district of Northern Belàspùr which the author describes in the latter portion of the book, there is a high and prominent hill much frequented by these animals, and called in consequence Gaur-duàri, or the pass of the bison. The author also appears to confound the bison of Central India with the similar but not identical animal, known as the Mithan or Mithna, found on the hill ranges of Eastern and North-Eastern Bengal.

From the description given of some of the shrines and pilgrimages met with in these hill districts, an idea may be formed of the way in which the Hinduism of Hindustan proper has been localised; and how the scenes of some of the principal events of Hindu mythology have been transferred from the Ganges and Jumna to the Narbada and its adjacent heights.

The latter portion of the volume is devoted in a great measure to the country lying under and east of the Mykul range; that is the range which, according to the author's definition, forms the eastern boundary of the Highlands of Central India. This tract of country is remarkable, because it presents, perhaps, the greatest sweep of unbroken jungle and forest to be found in India south of the Ganges and Brahmaputra. It is neither plain nor hill, but rocky with gentle undulations, and covered with forest. Only a few miserable villages are found throughout the whole country; just enough to make its wildness and desolation more striking. Such a country, unfitted by nature for cultivation, and exhaling a deadly malaria, must long remain the home of the elephant, the tiger, and of the animals on which the latter preys; nor are there found any remains or traditions which would indicate that the place had ever been more thickly populated than it is at present. Here man is the inferior animal, and the wild elephant is the lord of the country. He roams at will from place to place, and, just when the unhappy villager looks to gather in his scanty rice crop, wrung with difficulty out of an unwilling soil, he invades the fields and browses at leisure on the ripening grain, utterly scorning the feeble efforts of the hapless owner to drive him away. Probably no European has braved the deadly malaria of the country at the time of the ripening of the rice crop, or that of the drying up of the rains, but the deep and enormous foot-prints imprinted in almost every field by this jungle ravager remain visible throughout the dry season, and tell the tale of spoliation only too plainly.

Throughout this district, and indeed with most of the tribes who inhabit the wilder and more remote parts of Central India, such religion as the people possess is "devil" worship and fetishism, with just so much gloss of Hinduism as may be imparted by a rare visit to a Hindu shrine, or the presence of a brahmin whenever anything is to be got—which is seldom.

A Gond legend, taken down from the lips of one of their most celebrated bards, and translated by the author into blank verse, in imitation of Longfellow's "Song of Hiawatha," is given at length; it is interesting because it brings in here and there some curious little bits of savage life, and also from the very strong resemblance of the whole legend to that on which Longfellow's poem is based. Moreover, as the author points out, a still more curious analogy will suggest itself to the careful reader.

The whole work is written in a very lively and readable style. It will be found amusing by those fond of sporting anecdotes; and though the subjects may be thought to have an interest too local for the general reader, yet the spectacle here presented of races of men just emerging from utter barbarism, and acquiring the rudiments of civilisation, gives to the country and its inhabitants an interest which it would not otherwise possess.

M. T. SALE

OUR BOOK SHELF

Lecture Notes for Chemical Students.—Vol. II. Organic Chemistry. By E. Frankland, D.C.L., F.R.S. (London: John Van Voorst.)

IN this, the second part of "Lecture Notes for Chemical Students," Dr. Frankland develops very fully his own peculiar notation. The use of thick letters, as $\mathbf{C}\,\mathrm{H}_4$; of contracted symbols for many organic radicles, as Ayo for $C_5H_{11}O$; of a peculiar way of writing the formulæ of well-known substances, so as at first sight to make them appear as if they were new compounds, as $\mathbf{N}\mathrm{PhO}_2$, representing nitrobenzol; these and a few other remarkable characteristics will make this book, we should think, seem rather startling to the ordinary student. By combining attendance on lectures on organic chemistry with careful reading and a good deal of patient work, the student will find these "Lecture Notes" very useful, containing as they do, in small space, the results of the latest investigations as these bear upon the molecular constitution of organic compounds. Very large use is made of graphic formulæ, and also of the theory of types. The types used are somewhat different from those with which we are familiar in the text-books, and certainly the names applied to them are derived more from an anatomical than a chemical vocabulary; thus, the marsh gas type is termed the "Monadelphic," the methyl type the "Diadelphic," and so on. The very useful and scientific method of writing the formulæ of all organic acids, as containing the group COHO; all alcohols, as containing CH_2HO; and all aldehydes, as containing COH, is adopted throughout. The relations of alcohols, aldehydes, and

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acids; the passage from one class of alcohols, &c., to another; and very many other points of great scientific value, too commonly overlooked in the text-books, are here all carefully noted. As we said, the book requires attentive study, but this it will certainly repay.

M.M.P.M.

Thermal Paths to the Pole. An Address delivered before the St. Louis Mercantile Library Association in January 1872. By Silas Bent.

IN this pamphlet the author repeats the substance of a lecture delivered in 1868, the object of which was to show that the continuations of the warm Gulf Stream of the Atlantic, and of the Japan current in the Pacific, afford the only practicable avenues by which ships can enter an assumed open sea round the North Pole; and points out how the more recent Arctic explorations have confirmed the views then advanced.

The author's opinions should derive weight from the fact that he was one of the leading scientific observers in the American expedition of 1852, during which the Japan current was mapped out, and from his twenty-five years of observations at sea.

So far as the warm drift continuing the Gulf Stream into the Arctic region between Spitzbergen and Nova Zemlia is concerned, the theory of its influence (which, however, can hardly be called "original," since it has been current among Arctic authorities for many years) has indeed been remarkably confirmed in the past year by Payer and Weyprecht's voyage in open water to 79° N. lat. But it remains to be shown that the summer current from the Pacific through the narrow and shallow passage of Behring Straits has any considerable influence on the condition of the Arctic basin. In the circumpolar chart which accompanies the pamphlet, Behring Straits has been carefully widened to admit the Kuro-Siwo in a breadth quite equivalent to that of the Gulf Stream drift.

A considerable portion of the address is devoted to the description of a method by which "were it not for the inhumanity of exercising such a power," the whole of Europe might be placed at the mercy of America. Europe derives its mild climate from the Gulf Stream, and to divert this stream from its present direction would be to make "Europe a frozen wilderness." This grand result, the author believes, could be accomplished "by the possession of the Isthmus of Panama and the expenditure of half the cost of the recent war between France and Germany, in the excavation of a sufficient width and depth of the rock only that intervenes between the Caribbean Sea and the Pacific." Mr. Bent has himself, however, thrown some doubt on the entire practicability of his design by quoting, in a previous paragraph, the belief expressed by Professor Maury that the great mass of the Gulf Stream is formed by that part of the equatorial current of the Atlantic which passes to northward of the Antilles, and which "must be a hundred-fold greater than that which returns to the east from the Gulf of Mexico;" he has also omitted to notice that the force of the drift in the Caribbean Sea is not directed in any degree against the narrower portion of the isthmus, and we presume that even Mr. Bent would not attack the plateaus of Guatemala or Mexico.

K. J.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.*]

Spectroscopic Nomenclature

THE letter of Captain Herschel upon "Spectroscopic Nomenclature," which appeared in NATURE of April 25 contains many criticisms that are eminently just and timely, but there are one or two points in respect to which I should like to express dissent.

Thus as regards the name D_3 (to which he objects) for the yellow line of the chromosphere spectrum, it is not easy to see what other designation would better convey to the mind an idea of its position in the spectrum and its importance, without involving any assumption, or hypothesis even, as to the material causing it.

To say nothing of the fact that the whole Greek alphabet would not suffice to name one in three of the bright lines which have been observed in the chromosphere spectrum, there is this further difficulty, that if the letters are to be applied to lines in the order of discovery, ω is as likely to fall between α and β as anywhere else, but if according to position in the spectrum, then every discovery of new lines involves a revision of the nomenclature.

It seems doubtful therefore whether any better system is possible than to designate lines by reference to some standard map of the spectrum, as stars are catalogued by their right ascension and declination.

An accurate chart of the solar spectrum on which the lines should be mapped according to "inverse wave-length," proposed by Captain Herschel himself I believe, as well as by Mr. Stoney and others, would sufficiently resemble the spectrum seen in a spectroscope to be equally convenient in the observatory with that of Kirchhoff, and would be free from the reproach of arbitrariness and irregularity in its scale. Such a chart would be most gladly welcomed by all spectroscopists, and would immediately supersede those of Kirchhoff and Angström.

With reference to the green corona line, he writes "and now we have '1474.' No one knows what the true position of that line is. The line 1474 K is an iron line, and it is to the last degree improbable that the corona line is identical with it." I am not quite sure what is meant by the second clause. If only, that the position of this line may *possibly* (not by any means *probably*) be doubtful to the extent of $\frac{1}{4}$ of one of Kirchhoff's scale divisions, that is about $\frac{1}{4}$ the distance between the two E lines, I have nothing to object.

But if the sentence is intended, as one would naturally suppose, to convey the idea that the position of the line is not very accurately determined, and may be considered uncertain to the extent of several scale divisions, it is certainly wrong. I *know* of what I affirm, and perhaps may be allowed to refer to an article in this journal for Feb. 2, 1871, in which the evidence is stated as it was at that time, and it has received confirmation since.

Indeed as this bright line is almost always visible in the chromosphere to an instrument of sufficient power, I think I may confidently appeal to Mr. Lockyer or Dr. Huggins to bear me out in the statement that the bright scarlet line of the chromosphere appears to coincide no more perfectly with the dark C, than does this green corona line with the dark line at 1474 K.

I confess I am almost sorry that the spectrum of iron shows a bright line coincident with 1474, for all things considered, I cannot think that iron vapour has anything to do with this line in the spectrum of the corona, and the coincidence has probably only served to mislead.

But there are in the spectrum many cases of lines belonging to the spectra of different metals coinciding, if not absolutely, yet so closely that no existing spectroscope can separate them, and I am disposed to believe that this close coincidence is not accidental, but probably points to some physical relationship, some similarity of molecular constitution perhaps, between the metals concerned.

So in the case of the green coronal matter, is it not likely that, though not iron, it may turn out to bear some important relation to that metal? And yet I for one should be very glad if the application of higher dispersive power should show the apparent coincidence to be merely a very close juxtaposition.

C. A. YOUNG

Dartmouth College, U.S.A., May 16

Historical Note on the Method of Least Squares

THIS excellent method for the discussion of observations was published and first practically applied by Gauss in his Theoria Motûs, 1808. In the *American Journal of Science* for June 1871, Mr. Cleveland Abbe has shown that Prof. Robert Adrain, of New Brunswick, New Jersey, U.S., independently discovered the same method in 1808. I wish to call attention to what seems to me a singular oversight in the history of this subject, viz., to

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